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**Implications of population aging and resulting multiple social responsibilities
on health outcomes of the workforce**

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Chapter V

Effort-reward imbalance, work-privacy conflict and burnout among hospital employees

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ABSTRACT

Objective Studies investigating the relative importance of effort-reward imbalance and work-privacy conflict for burnout risk between professional groups in the healthcare sector are rare and analyses by educational attainment within professional groups are lacking.

Methods The study population consists of 1422 hospital employees in Switzerland. Multivariate linear regression analyses with standardized coefficients were performed for the overall study population and stratified for professional groups refined for educational attainment.

Results Work-privacy conflict is a strong predictor for burnout and more strongly associated with burnout than effort-reward imbalance in the overall study population and across all professional groups. Effort-reward imbalance only had a minor effect on burnout in tertiary-educated medical professionals.

Conclusions Interventions aiming at increasing the compatibility of work and private life may substantially help to decrease burnout risk of professionals working in a healthcare setting.

Keywords: effort-reward imbalance, work-privacy conflict, burnout, hospital employees, health professionals

INTRODUCTION

Burnout is a psychological syndrome characterized by emotional exhaustion and fatigue [1]. It is a consequence of occupational stress and results from long-lasting adverse and emotionally demanding working conditions [1]. Risk factors for burnout in a work environment are high workload, low personal control, insufficient rewards, low social support, lack of reciprocity between efforts and rewards, conflict between individual and organizational values [2] and shift work [3]. Health care professionals face various occupational stressors [3,4] that result in an elevated burnout risk compared to the general population [5]. Several studies report high rates of burnout in nurses [6–8] as well as physicians [9,10] whereas the burnout rate varies by occupational groups and specialty [7,10–12]. Studies have identified different predictors of work stress and burnout between occupational groups [13–15] and between educational levels within an occupational group [16]. However most studies on burnout in the healthcare setting focus on one occupational group and therefore miss the opportunity to directly compare health professionals despite interprofessional teamwork in a hospital. Moreover literature investigating differences in burnout risk between occupational groups and taking into account educational attainment is widely lacking, despite uncontentious differences between and within occupational groups regarding working conditions, demands and responsibilities [17]. These in turn are important with respect to burnout risk. Future interventions could profit in the way that the programs can be better targeted to the needs and environments of these subgroups.

Two widely used work-related stress models, *effort-reward imbalance* (ERI) and *work-privacy conflict* (WPC), provide a theoretical framework to explain the development of occupational stress and subsequently burnout. ERI postulates that occupational stress arises when there is a lack of reciprocity between effort and reward at the workplace i.e. high efforts spent and low reward received. This perceived imbalance generates stress and results in various adverse health effects [18]. Whereas ERI focuses on the imbalance within the working situation, the WPC focuses on the inter-role conflict between work and private life [19]. Stress resulting of these inter-role conflicts may spill over from work to private life or vice versa and can be understood as a result of the changing working conditions in Western societies over the past decades [20]. Both of these stress measures are predictive for

burnout [2,8,12,20–22]. Although ERI is a measure for work-specific stressors and hence is in theory expected to be stronger associated with burnout than WPC [2], WPC was found to be a stronger predictor for burnout in studies directly comparing their effect on burnout risk among various occupations [20] as well as among health professionals [12]. Interestingly, WPC was not much stronger associated with burnout than ERI across all medical professions [12].

Burnout among health care professionals does not only harm their health and well-being but is a threat to patients safety [23,24] and the continuity of care [25] and diminishes quality of care [10]. Hence identifying whether the imbalance of effort and reward at work or the imbalance between work and private life predicts burnout for different medical occupations can lead to better targeted interventions to prevent burnout. We therefore seek to answer the following research questions:

1. Is ERI or WPC the stronger predictor for burnout risk in the healthcare setting?
2. Is the relative predictive importance of ERI and WPC with respect to burnout risk different between professional groups and educational levels in the healthcare setting?

METHODS

Data was gathered through an anonymous employee survey on working conditions and health among six hospitals and rehabilitation clinics in German-speaking Switzerland. The six hospitals and clinics varied by type (regional, cantonal and university hospital, rehabilitation clinic), size (workforces ranging from 473 to 2182 employees), degree of specialization and urbanization of catchment area. All permanent employees (n=4497) received a questionnaire containing 100 questions. They were asked to return it with the enclosed postage paid envelope. Three weeks after initial distribution a reminder was sent to all employees. In total, 1844 questionnaires were returned resulting in a response rate of 41%. Compared to Switzerland as a whole, our sample has a larger proportion of women (85% compared to 75% in Switzerland), a similar share of physicians and nurses whereas the share of tertiary educated nurses was lower in our sample [26,27]. We restricted our study population to women (n=1570) with complete information on age, sex and professional group (n=1422) due to the

low number of men with complete information on all variables of interest (n=247) and the expected effect modification by sex. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No approval by an ethics committee was required as this study is based on survey data that was collected on a voluntary and anonymous basis.

Burnout: We measured burnout risk with the validated German version of the personal burnout scale [19] from the Copenhagen Burnout Inventory [1]. This scale consists of six questions regarding the prolonged physical and psychological fatigue. Participants are required to indicate how frequently they experience these symptoms with five answer categories ranging from *always* (100), *often* (75), *sometimes* (50), *seldom* (25) to *never/almost never* (0). The burnout risk score is the average score of the items answered whereas at least three items have to be answered in order to get a valid burnout risk score. A score of 50 and above points to being at an increased risk of having or developing a burnout. The average burnout score was 33 in the original Danish study whereas the reference score of the German validation study is 42 [28].

Effort-reward imbalance: We assessed occupational stress with the long version of the validated German effort-reward imbalance scale. There are two subscales: *effort* contains six items and *reward* contains ten items, both on a 4-pt Lickert scale ranging from *I totally agree* to *I totally disagree*. Items were summed up for each subscale and the ratio was calculated by dividing the sum score of the effort subscale through the sum score of the reward subscale and multiplied by the correction factor 10/6 to adjust for the unequal number of items per subscale. A ratio over one indicates an unfavorable imbalance characterized by high efforts spent which are not met with corresponding rewards.

Work-privacy conflict: We used the German translation of the WPC scale [19] which is an adapted version of the work-family conflict scale measuring inter-role conflict between work and private life [29] and is part of the Copenhagen Psychosocial Questionnaire (COPSOQ) questionnaire. It measures solely the work to family spillover and consists of five items with five answer categories ranging from

I totally agree (100), I agree (75), neither agree nor disagree (50), I disagree (25), to I totally disagree (0). The WPC score is the averaged sum score, whereas at least three items must have been answered in order to get a valid WPC score.

Social support: The questions to assess social support stemmed from the stress study of the State Secretariat for Economic Affairs (SECO) in 2000. It was asked whether one could rely on social support from partner, friends, relatives, supervisors, closest colleague at work, other work colleagues when they face private problems and when they face problems at the workplace. The answer categories were “never”, “sometimes”, “often” and “always”.

In consultation with the participating hospitals we formed the following professional categories: *administrative staff, nurses, academic staff* including medical-therapeutic experts and medical-technical experts as well as *physicians*. Educational level was assessed in three levels according to the Swiss Health Survey and the International Standard Classification of Education (ISCED). Whereas academic staff and physicians inherently have tertiary education, administrative staff and nurses can be split into non-tertiary (primary/secondary) and tertiary education. Hence, professionals groups resulted in the following six categories: *non-tertiary administrative staff, non-tertiary nurses, tertiary administrative staff, tertiary nurses, academic staff* and *physicians* (See Table 1).

Descriptive statistics are used to describe the study population according to burnout risk. We used Pearson’s correlation to check for the multi-collinearity of ERI and WPC and performed multivariate linear regression analyses to assess the effects of ERI and WPC on burnout risk while adjusting for age, marital status and work volume. By using standardized coefficients (beta), we were able to compare the relative importance of the two predictors ERI and WPC. To check for the robustness of the effects, we included further explanatory variables such as hours of overtime per week, social support in case of private problems and work problems from direct supervisor, closest colleague and other colleagues in the sensitivity analyses. We performed all analyses using STATA 14.0 [30].

RESULTS

In our female study population tertiary educated staff is younger compared to non-tertiary staff (Table 1). Most participants are married whereas in tertiary educated hospital employees the share of married and single is about the same. Tertiary professions mostly work full-time whereas in non-tertiary professions working part- and full time is more balanced. Most missings are found in ERI, especially in administrative staff regardless of educational level.

Table 1. Descriptive statistics for overall study population and stratified for professional groups

	Overall staff	Non-tertiary administrative staff	Non-tertiary nurses	Tertiary administrative staff	Tertiary nurses	Academic staff	Physicians
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total	1547 (100)	215 (100)	358 (100)	81 (100)	462 (100)	281 (100)	150 (100)
Age							
Under 25	107 (7)	23 (11)	42 (12)	0 (0)	33 (7)	8 (3)	1 (1)
25-34	429 (28)	26 (12)	61 (17)	15 (18)	170 (37)	101 (36)	56 (37)
35-44	385 (25)	44 (20)	84 (23)	22 (27)	105 (23)	75 (27)	55 (37)
45-54	394 (25)	73 (34)	97 (27)	28 (35)	112 (24)	59 (21)	25 (17)
55+	232 (15)	49 (23)	74 (21)	16 (20)	42 (9)	38 (13)	13 (9)
Marital status							
Married	749 (48)	111 (52)	181 (51)	38 (47)	214 (46)	129 (46)	73 (49)
Single	614 (40)	62 (29)	120(34)	28 (35)	204 (44)	131 (47)	68 (45)
Divorced/widowed	182 (12)	42 (19)	54 (15)	15 (18)	42 (9)	20 (7)	9 (6)
Missing	2 (0)	0 (0)	0 (0)	0 (0)	2 (1)	0 (0)	0 (0)
Work vol.							
100%	471 (31)	60 (28)	80 (22)	30 (37)	148 (32)	74 (26)	79 (53)
80-99%	400 (26)	49 (23)	76 (21)	24 (30)	139 (30)	86 (31)	27 (18)
51-79%	419 (27)	62 (29)	116 (33)	24 (30)	96 (21)	82 (29)	39 (26)
30-50%	206 (13)	36 (16)	65 (18)	3 (4)	68 (15)	31 (11)	3 (2)
-30%	49 (3)	8 (4)	20 (6)	0 (0)	11 (2)	8 (3)	2 (1)
Missing	1 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)
ERI							
Lowest quartile	364 (24)	48 (22)	87(24)	18 (22)	115 (25)	67 (24)	37 (25)
2nd lowest quartile	356(23)	47 (22)	78(22)	19 (24)	112 (24)	71 (25)	36 (24)
2nd highest quartile	360 (23)	48 (22)	84(24)	17 (21)	108 (23)	64 (23)	33 (22)
Highest quartile	356 (23)	47 (22)	79(22)	17 (21)	106 (23)	65 (23)	33 (22)
Missing	111 (7)	25 (12)	30(8)	10 (12)	21 (5)	14 (5)	11 (7)
WPC							
Lowest quartile	419 (27)	74(34)	90(25)	23 (28)	138 (30)	75 (27)	39 (26)
2nd lowest quartile	354 (23)	48 (22)	95(27)	17 (21)	116 (25)	79 (28)	45 (30)
2nd highest quartile	452 (29)	47 (22)	98(27)	23 (28)	95 (21)	58 (21)	32 (21)
Highest quartile	317 (21)	45 (21)	74(21)	16 (20)	113 (24)	68 (24)	34 (23)
Missing	5 (0)	1 (1)	1 (0)	2 (2)	0 (0)	1 (0)	0 (0)

The unadjusted mean burnout risk score is lowest among the non-tertiary professional groups and highest among physicians (Table 2). Across all professional groups the burnout risk score is higher compared to the original Danish study whereas only the burnout score for physicians is also higher than the German reference score. There is a clear positive association between ERI as well as WPC and burnout risk among all professional groups. Pearson's correlation between ERI and WPC varied

from 0.44 in academic staff to 0.58 in tertiary administrative staff. As the interaction term for ERI on one and hand WPC on the other was not significant, it was not included in multivariate linear regressions to keep the model simple and the interpretation straightforward.

Table 2. Unadjusted mean burnout risk score (0-100) incl. standard deviation by levels of ERI and WPC, by professional group

	Overall staff	Non-tertiary administrative staff	Non-tertiary nurses	Tertiary administrative staff	Tertiary nurses	Academic staff	Physicians
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Total	39.8 (17)	37.7 (18)	38.6 (16)	39.1 (17)	40.2 (16)	40.4 (17)	43.0 (16)
ERI							
Lowest quartile	32.2 (14)	30.6 (15)	31.7 (15)	31.5 (11)	32.9 (12)	31.0 (14)	32.1 (13)
2nd lowest quartile	36.5 (14)	37.1 (16)	35.7 (14)	33.1 (15)	36.8 (14)	39.5 (15)	40.0 (14)
2nd highest quartile	42.0 (16)	35.1 (21)	41.3 (15)	42.4 (13)	41.7 (14)	44.7 (17)	45.9 (13)
Highest quartile	48.6 (17)	47.2 (19)	47.8 (16)	53.9 (21)	49.6 (17)	47.1 (17)	54.3 (16)
WPC							
Lowest quartile	29.7 (15)	31.2 (17)	27.6 (14)	25.2 (12)	31.2 (13)	29.2 (14)	31.5 (12)
2nd lowest quartile	36.0 (14)	30.9 (16)	36.9 (15)	35.5 (13)	36.8 (13)	39.1 (14)	40.0 (12)
2nd highest quartile	43.3 (14)	38.2 (14)	40.0 (14)	44.0 (12)	44.2 (13)	44.8 (16)	51.0 (15)
Highest quartile	51.8 (15)	54.2 (17)	52.4 (13)	52.4 (15)	51.0 (16)	50.7 (16)	52.3 (14)

In the overall study population both ERI and WPC are significantly and positively associated with burnout risk whereas the beta coefficient for WPC is much higher (Table 3). Likewise across all stratified analyses for the professional groups, WPC is the stronger predictor for burnout risk. The largest effect is found for administrative staff with tertiary education followed by physicians and non-tertiary nurses and the beta coefficients vary between 0.43 and 0.55. ERI only has a significant effect on burnout risk in tertiary nurses, academics and physicians. The beta coefficient for ERI in the stratified analyses varies between 0.20 to 0.27 and is about one fourth the size of the beta coefficient for WPC in the overall study population. The largest effect of ERI on burnout risk is found among physicians followed by tertiary administrative staff, academic staff and tertiary nurses.

Table 3. Standardized effects of ERI and WPC (beta coefficient) on burnout risk for overall study population and stratified for professional groups

	Overall staff	Non-tertiary administrative staff	Non-tertiary nurses	Tertiary administrative staff	Tertiary nurses	Academic staff	Physicians
Age	0.10***	0.26**	0.06 NS	0.15 NS	0.02 NS	0.19**	0.14 NS
Marital status							
Married	0	0	0	0	0	0	0
Single	0.07**	-0.06 NS	0.05 NS	-0.07 NS	0.17**	0.06 NS	0.05 NS
Divorced/widowed	0.03 NS	0.11 NS	-0.04 NS	-0.03 NS	-0.02 NS	0.05 NS	0.03 NS
Work volume	0.06**	-0.01 NS	-0.06 NS	0.08 NS	0.14**	0.14*	0.15 NS
WPC	0.42***	0.44***	0.48***	0.55***	0.43***	0.43***	0.49***
ERI	0.10***	0.14 NS	0.09 NS	0.22 NS	0.20***	0.20**	0.27***
Adjusted R ²	0.31	0.31	0.32	0.45	0.33	0.31	0.39
N	1422	190	323	69	436	265	139

NS: not significant; * p < .05; ** p < .01; *** p < .001

In the overall study sample, ERI and WPC as well as the control variables age, marital status and work volume can explain 31% of the variance in burnout risk (Table 3). The highest adjusted R² was found for tertiary administrative staff and physicians. Results from the sensitivity analyses point to stable results. The additional explanatory variables for overtime and social support are not associated with burnout risk - with few exceptions: In administrative staff with tertiary education, ERI is significantly associated with burnout risk when adjusted for overtime as well as social support from direct supervisor and colleagues in case of work and private problems.

DISCUSSION

For both, ERI and WPC, we found clear gradients according to burnout risk. Moreover a strong and constant association between WPC and burnout risk among all professional groups is evident whereas ERI only seems to be relevant with respect to burnout risk in tertiary educated professional groups.

Despite the well-investigated relationships between WPC and burnout as well as ERI and burnout, to our knowledge this is the first study to compare the relative importance of these measures for burnout in different professional groups taking into account educational attainment within a common healthcare setting. The only previous study with the same focus [12] neglected to refine the

professionals groups for educational attainment and was based on very small numbers for most professional groups.

In contrast to a previous study reporting highest burnout risk for nurses [7], we also found the highest burnout risk among physicians [12]. Generally, we found higher burnout risk scores in professional groups with tertiary education. This could be a result of greater perceived work stress [16] through higher demands and expectations as well as more responsibilities imposed through their higher qualifications [31,32]. However only minor differences in burnout risk were found between nurses with different educational levels [31]. The high explained variance in the overall study population as well as across different professional groups strongly suggests burnout being a result of occupational stress [1] due to ERI [18] and WPC [19]. However a previous study found that the association between ERI as well as WPC and burnout risk is not fully mediated by general stress [12], suggesting that ERI and WPC have direct effects on burnout that cannot be explained by stress in general.

Regarding our first research question, namely whether ERI or WPC is the stronger predictor in the healthcare setting, we found a much stronger association with WPC than with ERI. Hence inter-role conflicts between work and private life, in particular strain spilling over from work to private life, seem to be more strongly associated with burnout risk than an imbalance between efforts spent and reward received. This is against theoretical expectations as conceptually speaking burnout is a syndrome resulting of longstanding adverse working conditions [2]. However our findings are in line with previous studies reporting a stronger association for WPC than ERI with burnout [12,20]. Remarkably, a previous Swiss study among hospital employees focusing on relative importance of ERI and WPC on burnout risk reported a coefficient for WPC with respect to burnout is of the same strength ($\beta=0.43$) whereas they reported a stronger beta coefficient for ERI with respect to burnout risk ($\beta=0.24$) was stronger than in our overall study population ($\beta=0.10$) [12]. However when we compared these results with our findings in stratified analyses, we saw similar standardized coefficients for both WPC and ERI with respect to burnout risk among tertiary nurses and academic staff whereas we find stronger associations for physicians.

As regards our second research question, whether the relative predictive importance of ERI and WPC with respect to burnout risk differs between professional groups and educational levels, we found that WPC is stronger associated with burnout than ERI across all professional groups. Whereas WPC is a strong predictor for burnout risk in all six groups, ERI is only weakly associated in three professional groups and not associated in the remaining three groups. Interestingly, ERI only plays a role for burnout risk in the tertiary medical professions, whereas in tertiary administrative staff, ERI as an explanatory factor was close to significant ($p=0.05$). Our findings do not fully support the results of a previous Swiss study revealing different associations between these stress measures and burnout for the different medical professions: For therapists and medical-technical staff (which we had to merge into academic staff) as well as for physicians, ERI seemed to play a more important role than WPC with respect to burnout risk [12]. Although this is not the case in our study population, for tertiary nurses, academic staff and physicians ERI has a weak but significant impact on burnout risk, which is in line with previous studies [8,22]. However no associations between ERI and burnout risk were found in the other professional groups which is at variance with previous studies [12,22]. Hence imbalance of efforts spent and rewards received at work does not seem to play an important role with respect to burnout in primary and secondary educated hospital staff whereas such an imbalance matters for tertiary educated staff. As higher educated professionals usually score higher on effort-reward imbalance and overcommitment scales [33] an imbalance of effort and reward might be more important for them with respect to burnout. Insufficient rewards such as having professional esteem/status was found to be important for burnout risk in physicians [11].

There are several limitations of this study. We cannot generalize our findings for health professionals as our study population is a non-representative sample of healthcare professionals in Switzerland and we excluded men from the sample due to their low number. Although we conceptualize ERI and WPC as antecedents or predictors of burnout, we cannot make causal inferences as our data is cross-sectional. Further, the response rate of 41% may result in non-response and selection bias. Due to the small number of participants in some professional groups, the standard errors are relatively large.

Moreover, the low number in some professional groups required to merge some categories despite of different working conditions.

It can be concluded that interventions aiming at reducing work-related stress, especially increasing the compatibility of work and private life are an effective approach to reduce the burnout risk of hospital employees and thus increase patients safety [23,24] and continuity [25] and quality of care [10]. The cause for ERI to matter only for burnout risk in tertiary educated hospital employees remains unclear and should be further investigated. Hence larger studies evaluating the different causes of burnout for hospital employees with different educational levels are needed.

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